

Should Uranium Stay in the Ground?



OUTLOOK CLOUDY FOR CLUFF LAKE

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Saskatoon Environmental Society

By John Twigg
(Excerpted from The Financial Post)
Regina

A big dark cloud has moved in over the future development of northern Saskatchewan's rich deposits of uranium.

The cloud, in the form of increasing doubts about the safety of uranium mining, milling and waste storage, has been raised at the Cluff Lake uranium inquiry hearings.

The provincial government-appointed inquiry, under Mr. Justice E. D. Bayda, is examining Amok Ltée's proposed \$135-million mine-and-mill project at Cluff Lake in particular and uranium development in general, and is to recommend by Nov. 1 whether development should proceed.

The director of the province's Environmental Assessment Branch said the impact study prepared for Amok was not as good as it could have been.

Then three plant ecologists from the University of Saskatchewan proceeded to pick holes in the study for Amok by Stearns-Roger Inc., using words such as "grossly inadequate," "misleading," and "suspect" because it was too "pro-company." They expressed concern not only with its conclusions, but also with the techniques used, saying in some cases they did not conform to normal practices.

They were followed by a number of Environment Canada officials who criticized the insufficient baseline information taken to make a fair assessment of the project's impact. They expressed particular concern with the mine's potential impact on the surrounding water table.

Dr. Robert Pohl, of Cornell University's physics department, pointed out a glaring omission in Amok's plans—the failure to account for large quantities of thorium 230 in the tailings pile.

Pohl complimented Amok for planning to remove radium from the uranium ore during the milling

process, but he said there were still a number of ways in which serious damage could occur to the health of humans. He said uranium decays in 14 steps to become lead, and in that process a number of highly toxic elements, including thorium 230 and radon gas are created. He said the thorium that Amok planned to leave in its tailing pile would break down into these elements, with the main danger being the escape of radon gas into the atmosphere.

Pohl said the wind would carry the poisons for thousands of miles and contribute to the already large concentrations of nuclear wastes, which are blamed by the U.S. Environmental Protection Agency for causing a certain number of lung cancer deaths each year for each amount emitted.

Pohl also rejected the Stearns-Roger calculations of radioactivity at the mine site. He said the report failed to account for an increased surface exposure during the lifetime of the ore, and thus underestimated emanations.

After his presentation, Pohl told reporters he would not let Amok proceed if he had the choice. He said he is not necessarily against nuclear development, but its health impacts do not justify the cost of development. The best thing to do to solve the energy crisis, Pohl said, is to reduce wasteful consumption, rather than develop nuclear power and risk widespread health damage.

If that view were taken by the three members of the Cluff Lake inquiry board, it probably would be the end of uranium development in Saskatchewan, because the government would realize the political stupidity of fighting an election on the merits of causing cancer.

A key factor in the development question is Saskatchewan's own power needs, which are relatively minimal now. Even if domestic de-

mand does increase, there are massive supplies of coal more likely to be used in generating electricity. Thus Saskatchewan does not need the nuclear power itself, and stands to benefit only through a modest number of new jobs and royalties, while possibly risking the public health.

There are reasons to believe that more Amok-type uranium bodies will be discovered in northern Saskatchewan. A three-member consortium led by Uranerz already is

developing one at Key Lake, and exploration teams from around the world now are scouring the rim of the Athabasca Basin for more deposits despite the possibility of the whole development being stopped.

The fate of the uranium mines lies with the people of Saskatchewan who in theory could stop development if they became convinced that development would hurt their health. They have both the inquiry and a coming provincial election (in 1979) through which to express their wishes.

WHAT ARE THE ISSUES?

For most people, nuclear energy is a complex, far-removed subject. But for the people of Saskatchewan, nuclear development is quickly becoming a very important and immediate issue.

Saskatchewan has some of the world's largest and richest deposits of uranium—and it would seem that there are a great number of companies anxious to get their hands on them. Because of this interest, some people think uranium could soon become a larger contributor to the Saskatchewan economy than oil.

On the other hand, there are a growing number of people who think that it would be dangerous and irresponsible for Saskatchewan to allow any further development of the nuclear industry.

The following are some of the major questions that people are asking:

—Is there really an energy shortage? If there is, what kind of an energy shortage? Is nuclear energy the best answer? Is it the only answer?

—What sense does it make for our governments to continue putting most of their energy research effort into another energy source that will one day run out?

—What would further nuclear development mean for northern Saskatchewan? More jobs? Or more disrupted lives and a damaged environment?

—How much hazard to our life and

health should we be prepared to accept in pursuit of any source of energy?

—How much money do we stand to gain from nuclear development?

—What responsibility do we have to prevent our resources from being used in a way that will increase the chances of nuclear war?

—What right do we have to create risks that will exist not just in our lifetime, but will be handed down to our children's children tens of thousands of years from now?

If you feel that nuclear development is just too complicated and difficult to understand—better left to the experts—then consider the following quote from one of the leading experts in the nuclear debate. Amory Lovins says: "When experts disagree, as they often do, you may feel unable to resolve their technical differences for yourself. But often what look like technical differences are simply differences of personal values and are, therefore, easy for non-experts to judge."

The purpose of this publication is to help you sift the wheat from the chaff—to decide which are the actual technical arguments and which are mere differences in personal opinions.

It is our hope that when you read it, you will find that the information is of real help. The nuclear issue is too important to be left to the physicists.

WHAT WE DON'T KNOW CAN KILL US ... THE DEADLY EFFECTS OF RADIATION

The nuclear debate raises concern for the continuation of life itself, as we know it. No debate in history has carried such sombre implications.

Discussions of danger are almost commonplace in today's world. Dioxins and other chemical sprays, DNA recombinants, chemical and biological warfare devices, food additives and other environmental hazards are all gaining headlines and raising public concern.

Yet, no other danger has the long-term effects, the potential for widespread destruction, or the variety of unsafe features that attend radiation resulting from nuclear activities.

Radioactive substances emit three types of radiation . . . alpha, beta, and gamma rays. All are dangerous to living things.

Much remains to be learned about the effects of radiation. What

is already known, however, points to deadly consequences from exposure to radioactive substances, even in small amounts.

Radiation has been associated with leukemia; cancers of the bone marrow, thyroid, lungs, stomach, lymph nodes, pancreas ovaries and cervix; cataracts and other eye diseases; silicosis, a deadly lung disease; disorders of the endocrine system; skin diseases; severe anemia; sexual dysfunction; and most ominously, genetic mutations, some of which may not show up for several generations.

Worse yet, no one really knows for sure how much radiation is too much. Scientists still don't understand all of the effects radiation has on people, plants or animals. A major part of the problem is that radiation damage may be invisible for many years. If overexposure to radiation

affects your genes, the result may not appear until you have an abnormal child.

Since our experience with radiation is relatively short, it just isn't possible to know what some of the long-term effects of radiation will be.

As a result, legal limits on how



much radiation a person can be exposed to vary widely. West Germany has a legal limit of 30 millirems per year for a member of the public. Canada on the other hand has a legal limit of 500 millirems per year for a member of the public.

As nuclear stockpiles build, the number of radioactive releases into the environment and the food chain inevitably increases. In Canada, the example of Port Hope has had wide coverage. There radioactive mine tailings were thoughtlessly used as landfill under schools and homes.

Less well known is the radioactive contamination of the Serpent River system in Ontario. In 1964, an inspector for the Ontario Ministry of Health found that Elliot Lake and Quirke Lake had concentrations of radium well above the maximum permissible levels. Very little has been done since then.

RADIATION: THE NUCLEAR WORKER'S SHADOW OF FEAR

People who work with radioactive substances live with the ever-present danger of accidental overexposure to radiation. This is particularly true in the case of uranium miners who must always be wary of radioactive dust, radon gas, and deadly radon by-products. Workers in all other phases of the nuclear fuel cycle face similar dangers, and in addition they face the threat of "stray" radiation from highly concentrated products or a disastrous nuclear accident, as discussed in other articles.

But, what are the effects of working with radiation? What is being done to protect workers? And, what is a "safe" level of exposure to radiation?

Well-documented information has been gathered in recent years about the effects of working with radioactive materials at all stages of the nuclear fuel cycle.

The worldwide portrait drawn by this information is one of depressing odds and tragic neglect.

Studies show extraordinarily high rates of radiation-linked diseases among nuclear workers . . . diseases that may bring agonizing death.

Dangers

From the medical records of 3,883 workers at the U.S. government's nuclear plant at Hanford, Washington, Dr. Thomas Mancuso of the University of Pittsburg discovered the following: a lung cancer rate 64% above the national average; breast cancer rate 10% above national rates; bone cancer 74% above national figures; pancreas cancer 26% higher. The majority of the dead workers had annual radiation doses of less than one-tenth those allowed for Canadian workers.

Another U.S. study quoted in *The Miner's Voice* suggests that 16% of uranium miners who worked underground between 1946 and 1968 could die of lung cancer.

A recent study in Great Britain found that scientists and technicians

who work with plutonium die of leukemia at a rate seven to twenty times greater than the national average.

A Swedish study shows lung cancer among uranium miners to be twice the rate for the total population.

Closer to home, the 1976 Report of the Royal Commission on the Health and Safety of Workers in Mines (Ham Report) concluded that miners at Elliot Lake, Ontario, develop lung cancer at twice the average rate, confirming the findings of the Swedish study. The report cited the deaths of 81 Elliot Lake miners from lung cancer, when the predicted number would have been 45.

An Ontario Ministry of Health study is even more pessimistic. It

"miners at Elliot Lake, develop lung cancer at twice the average rate,"

reports that uranium miners between the ages of 40 and 60 develop lung cancer at five times the expected rate for that age group.

Cluff Lake

A great deal of time has been spent at the Cluff Lake Board of Inquiry discussing the health and safety of uranium miners, and debating the levels of radiation to which they may be exposed.

In fairness to Amok, their proposals include all the steps necessary to meet Canadian government legal safety levels. As well they are making use, for the first time in Canada, of equipment that can be attached to each miner to measure the amount of radioactive gas that he is breathing into his lungs.

The concerns about radiation exposure boil down to three important questions. Are the Canadian safety standards really good enough? Could Amok, with just a little bit more effort, do a lot better than simply meet existing regulations? Who will monitor the operation to

make sure that Amok will follow the regulations?

First, are Canadian radiation standards for the safety of uranium miners really good enough? It is important to realize that any amount of radiation, no matter how small, can cause biological damage. We are exposed to some radiation from the natural environment. Any extra amount is definitely not good for us, and could result in diseases such as lung cancer and leukemia, or in genetic damage in our children and grandchildren.

Radiation exposure is measured in a unit called millirems. In Canada, the federal government legally permits workers to be exposed to 5,000 millirems of whole body external radiation per year from uranium min-

ing operations or other nuclear facilities. On the other hand, these operations cannot legally expose a member of the general public in Canada to more than 500 millirems.

Other countries are setting much tougher regulations. Germany has recently set a maximum legal exposure of 30 millirems, and the United States is aiming at a level of 25 millirems over the next four years.

Radiation levels will be very high at the Cluff Lake mine site. Without shielding, workers would get their legal yearly dose in just a few hours. An unprotected worker could get the equivalent of a year's radiation limit in fifteen minutes if he accidentally entered the area used to store concentrated uranium ore. Clearly, Amok had to take steps to shield workers from radiation danger.

The Saskatoon Environmental Society has criticized Amok for not always doing what it could to shield workers from radiation. The Occupational Health and Safety Branch of the provincial government has also

commented on this. Shielding is sufficient to meet the regulations, but it is obvious that Amok has not set out to achieve the lowest radiation risks that it would have been reasonably practicable to achieve. For instance, Amok proposed no shielding at all for the backhoe operator working in the uranium pit. Any amount of shielding helps to substantially reduce the exposure of the operator. In the design of the mill, there are several places where a bit of extra concrete shielding can substantially reduce radiation levels. For instance, by increasing the concrete shield around the crusher, hopper and ore storage area from 36 to 42 centimetres, radiation levels at one metre in each of these locations can be reduced from 0.93 millirads per hour to 0.5 millirads per hour. (See page 2760 of Cluff Lake Inquiry transcript.) Amok will make hundreds of millions of dollars in clear profits from the Cluff Lake mine, so it can well afford these extra protective features. The Saskatoon Environmental Society is concerned that this lack of initiative may typify the Amok attitude to worker safety if the mining operation is allowed to get underway.

The final and perhaps most important occupational health question is: who will monitor the Amok operation to make sure that workers are being protected? Right now the federal government is supposed to do the job through its Atomic Energy Control Board, but the Board has only paid two brief visits to Saskatchewan uranium mines over the past two years. The provincial government has taken on the job in the absence of federal initiative, but it is not clear whether the province can force the uranium companies to improve their safeguards if there are problems, because the question of provincial jurisdiction over uranium mining (once a mine starts) is still up in the air.

NUCLEAR REACTORS: HOW SAFE?

How safe are nuclear reactors—the devices used to make electricity from uranium?

On this point as on others the experts disagree. The experts all agree that normal nuclear reactors don't explode like atomic bombs. They can, however, get too hot—in which case the reactor core "melts down" and may release deathly radiation over a wide area. The probability of such an accident and the extent of damage that would be caused are the issues that the experts disagree about.

The Brookhaven Report, prepared for the pro-nuclear U.S. Atomic Energy Commission, estimates that a serious accident could result in 27,000 deaths, 17 billion dollars of damage, and a permanently contaminated area about the size of Nova Scotia and New Brunswick combined.

Most scientists agree that it is impossible to guess just how likely such an accident would be. A report that

it in part as "fiction".

Many experts within the nuclear industry think that the Rasmussen Report was far too optimistic about reactor safety. On February 2, 1976, three engineers resigned from General Electric after a total of 47 years in the nuclear business because, in their words, "... the risks of nuclear power are too great." In his letter of resignation, Mr. Dale Bridenbaugh, a former manager of performance evaluation and improvement, who had been working for General Electric for 22 years said: "Nuclear power has become a technological monster and it is not clear who, if anyone, is in control."

On February 3, 1976, Robert Pollard, project manager of the Indian Point reactor for the U.S. Nuclear Regulatory Commission, resigned his post. "If I had the authority, I would close down Indian Point Number 2 at once—it's almost an accident waiting to happen," said

"a serious accident could result in 27,000 deaths, 17 billion dollars of damage, and a permanently contaminated area about the size of Nova Scotia and New Brunswick combined."

was prepared specifically to try to convince the public and the insurance industry that nuclear power was safe—the Rasmussen Report—estimated the chance of a large accident at about 50% if there are 1,000 of the safer current-model reactors operating for 50 years.

Shortly after the Rasmussen Report was issued, though, William Bryan, an aerospace engineer, pointed out in a congressional hearing that the study was an exercise in futility because it had used analytical methods that had been completely discarded by the aerospace industry as unreliable. Ralph Nadar described

Pollard. "The magnitude of the hazards associated with these plants has been suppressed by the government because the release of such information might cause great public opposition to their operation," he stated.

The American nuclear industry has been counting on the Rasmussen Report to convince insurance companies to cover nuclear accidents. The insurance companies, however, have remained unconvinced of the safety of nuclear reactors. As a result, they still refuse to provide any insurance against major nuclear accidents. On March 31 of this year, an

American federal district court ruled that it is unconstitutional for the nuclear industry to continue without responsibility to pay damages in the event of an accident. The prospects of this decision for the American nuclear industry—the world's largest—are devastating.

Recently, the Canadian Coalition for Nuclear Responsibility learned that there are serious unresolved questions concerning the safety of the CANDU system. In a \$500,000 study

completed in November 1976, Ontario Hydro has admitted that, in the event of a major pipe break, the emergency core cooling system cannot be counted on to prevent fuel ruptures which would spill radioactive gases and iodine into the reactor building. This violates the principal safety design objective laid down by the Atomic Energy Control Board (AECB) for the emergency core cooling system, and it also contradicts earlier assurances given to the AECB.

NUCLEAR WASTES: AN UNSOLVED PROBLEM

When Saskatchewan uranium goes to a nuclear reactor, it will stay inside for a period of about two years, until the usable uranium has been "burned". After that period, uranium is like wood in the sense that the waste products, or ash, begin to "put out the fire". As a result, the "fuel" as it is called must be removed and fresh fuel inserted.

These spent fuel rods are both extremely hot and highly radioactive—many times more radioactive than fresh fuel rods. This is because inside a reactor natural uranium atoms are changed into other atoms, most of which are highly radioactive and do not occur in significant quantities in nature. There is no way of avoiding these artificial radioactive waste products because it is their creation that releases the energy in a nuclear reactor.

Because of their high level of radioactivity, nuclear waste products are poisonous and dangerous. Less than a millionth of an ounce of one of the waste products—plutonium—is enough to give you fatal lung cancer. Larger amounts of plutonium (about ten pounds) can be made into atomic bombs.

Unlike the kinds of garbage we are used to dealing with, a number of the nuclear wastes remain dangerous for long periods of time—anywhere from a few hundred years to hundreds of thousands of years. To give you some idea of the scale of the problem, one moderate-

wastes blew up for unexplained reasons at an American nuclear installation. The explosion injured one workman and contaminated nine others.

Even more disturbing is the fact that even if the problems of reprocessing plants are eventually solved, not all waste can ever be reprocessed, and those that can't be re-used must still be stored out of harm's way for tens of thousands of years. That's a problem not just for us or our children, but for generations farther into the future than human history reaches into the past.

Many ideas about permanent disposal of nuclear wastes have been suggested, but none have yet been proven to be satisfactory. It's not hard to see why the problems are difficult to solve. A proposal to put the wastes in rockets and shoot them into outer space was scuttled when people asked what would happen if the rocket misfired or exploded and dumped the wastes over a city.

Another idea was to vitrify the wastes (that is, to encase them in glass) and bury them in rock formations that have been dry and stable for millions of years—specifically salt mines.

After fifteen years of study and a hundred million dollars in research money, in 1971 Dr. Alvin Weinberg, then Director of Oak Ridge National Laboratory, announced U.S. plans to dispose of high-level radioactive wastes in an abandoned salt mine in

"Less than a millionth of an ounce of plutonium - is enough to give you fatal lung cancer."

sized nuclear reactor produces more radioactive garbage in one year than would result from 1,000 Hiroshima-sized bombs.

When the waste first comes out, it is put into large cooling tanks next door to the nuclear reactor. In Canada these cooling tanks are already filling up very quickly with tons of high level radioactive waste.

Originally, scientists planned to reduce the problem by trying to re-use some of the waste as fuel. Unfortunately, there isn't a single commercial reprocessing plant in operation in the United States or Canada right now, and no chance of one being in operation for at least five years. Several have been built—at great expense—but none are working. In the meantime hundreds of tons of dangerous wastes are left in limbo.

Nuclear industry representatives claim that these temporary waste storage areas create no real problems. But on August 30, 1976, a decade-old mixture of radioactive

Lyons, Kansas. He referred to it as "one of the most far-reaching decisions any technologists have ever made, since these wastes can be dangerous for up to a million years." Within two months, the project was abandoned as being clearly unsafe. Despite all the research, it turned out the mine leaked like a sieve.

A British Royal Commission that spent several years carefully studying nuclear issues had a strong opinion on the question of nuclear wastes. It said, "It would be irresponsible and morally wrong to commit future generations to the consequences of fission power on a massive scale unless it has been demonstrated beyond reasonable doubt that at least one method exists for the safe isolation of these wastes for the indefinite future."

The Royal Commission recommended that there be no substantial expansion of nuclear power in Britain until such a method is discovered and proved.

SOME MAJOR REACTOR ACCIDENTS

Windscale Reactor (England 1957)

Cause: fire in reactor core, undetected for two days.

Effects: 400 square miles of land contaminated; reactor shut down permanently.

SL-1 Reactor (Idaho Falls 1961)

Cause: accidental removal of central control rod.

Effects: crew of three killed by radiation; reactor destroyed, shut down permanently.

Fermi Reactor (Michigan 1966)

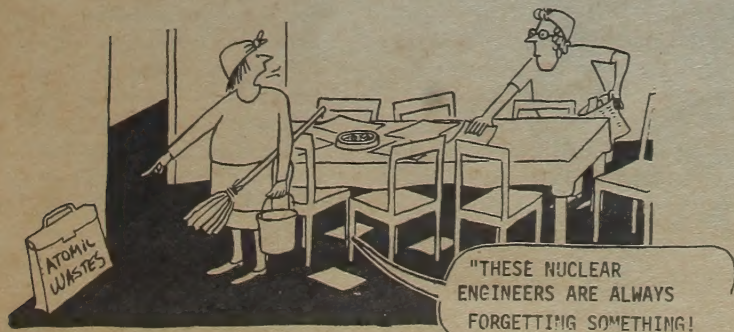
Cause: poorly welded piece of metal came loose.

Effects: partial core meltdown; evacuation of Detroit seriously considered; reactor closed down permanently.

Brown's Ferry (Alabama 1975)

Cause: accidental fire started by workmen with candle.

Effects: seven independent safety systems inoperative; extensive damage to reactor building.



THE CANADIAN NUCLEAR INDUSTRY - HISTORICAL NOTES

Since World War II the Canadian public has quietly invested billions in an industry about which it knows little.

In 1933, the Canadian nuclear industry consisted of a single uranium mine in the Northwest Territories and a refinery at Port Hope, Ontario, where Eldorado Gold Mines extracted radium from uranium ore for sale to the medical industry.

During and immediately following World War II, the Canadian government became very interested in the power locked in the uranium atom. They set up Nuclear Laboratories in 1942 to help the United States and Britain in their joint atomic bomb project, started up Canada's first experimental nuclear reactor in 1945, and passed the Atomic Energy Control Act in 1946. This act established the Atomic Energy Control Board (AECB), the body that is supposed to regulate the nuclear industry.

With the Cold War and the arms race, the demand for uranium boomed. Between 1948 and 1953, swarms of prospectors covered the north in search of radioactive deposits.

Uranium in Saskatchewan

Saskatchewan's first uranium mine (the Eldorado mine on Lake Athabaska, near Uranium City) began production in 1953. But the Eldorado ore deposits represent only 1/12 of Saskatchewan's known

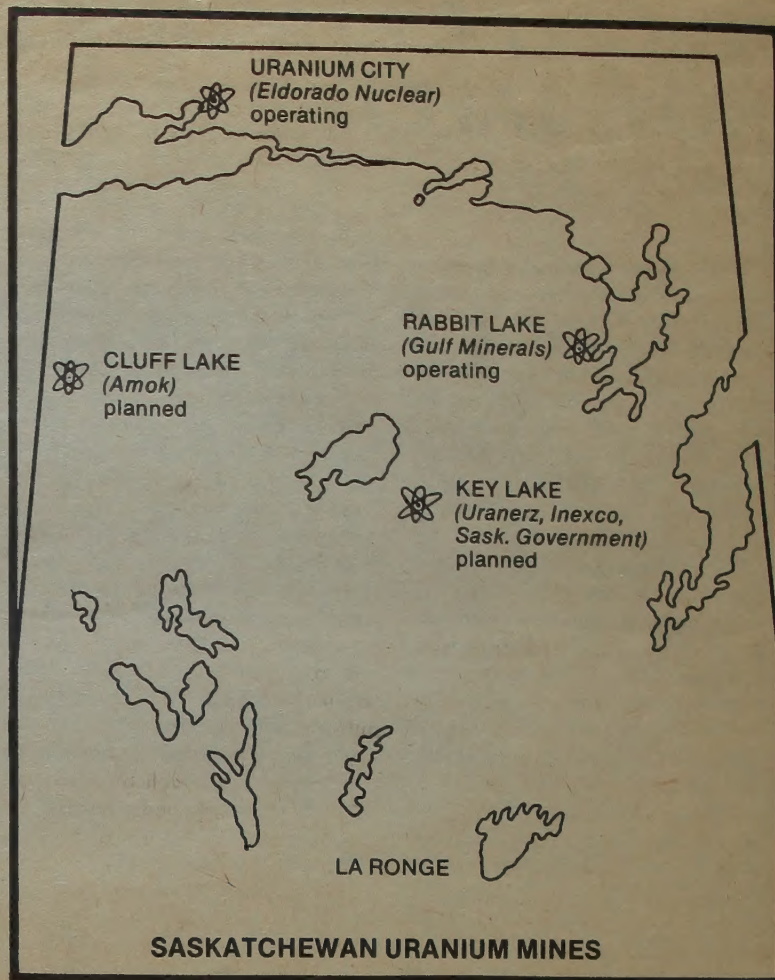
uranium reserves. Exploration has uncovered nine new uranium deposits over the last nine years—and these discoveries have put northern Saskatchewan on the world map of areas favourable for uranium exploitation.

The major known uranium deposits are located in four areas: Beaverlodge (Uranium City), Rabbit Lake, Key Lake and Cluff Lake.

One of the three deposits at Cluff Lake contains the world's second richest uranium concentrates. Rights on the Cluff Lake deposits are owned by Amok Ltée of France, who began constructing a mine site in 1976 and would like to go into production by 1979. It is the Cluff Lake uranium mine which is now being examined by the provincially appointed Bayda Commission. (See article on the Bayda Commission.)

These four major sites contain measured and indicated uranium reserves capable of producing 74,225 tons of milled ore (U₃O₈) and the companies involved are speculating on additional estimated reserves capable of producing 65,000 tons. The Financial Post has projected that Saskatchewan could well be producing half of Canada's uranium within the next five years.

The next step in nuclear development planned for Saskatchewan is the construction of a refinery to process milled ore (U₃O₈ or yellowcake) for use in nuclear reactors. The



\$50,000,000 refinery is planned by Eldorado Nuclear Ltd., which in cooperation with the Saskatchewan

Economic Development Corporation (SEDCO), has purchased options to buy land at Warman.

NUCLEAR WEAPONS: IN HOW MANY HANDS?

Will exporting nuclear reactors and fuels lead to more countries having nuclear weapons?

This is a natural and vital question because a nuclear war could mean the end of the world as we know it. Every additional country that has nuclear weapons increases the chances of nuclear war—especially if the country is threatened by a neighbour which is politically unstable, or under a military dictatorship.

As in many other aspects of the nuclear issue, the experts disagreed about how much effect the increasing use of nuclear power would have on the spread of nuclear weapons. Many spokesmen for the nuclear industry argued that safeguards and guarantees could be established that would effectively prevent a country which got a nuclear reactor and uranium from using them to make a bomb.

Other equally qualified experts felt differently. Herbert Scoville, former Assistant Director of Science and Technology with the U.S. Arms Control and Disarmament Agency, said: "Nuclear weapons will soon fall into many hands in many corners of the world—into the hands of unstable national governments, aggressive military cliques or irresponsible terrorist groups—with incalculable consequences for us all.

This danger is the direct result of the uncontrolled growth of the nuclear power industry, which is making widely available the materials needed for such weapons. The peoples of the world must recognize the danger of what is going on and act to protect this and future generations."

In the end, Mr. Scoville and others were proved correct. On May 18, 1974, India exploded its first

atomic bomb despite what were supposed to be ironclad Canadian safeguards on the peaceful use of the nuclear reactors and fuel we had provided.

Interestingly enough, the federal government continued to export nuclear technology and fuel to Pakistan after India exploded its bomb. Mr. Bhutto, Pakistani Prime Minister at that time, was quite open about the possibility that Pakistan would develop a bomb. He stated that he would "... never surrender to any nuclear blackmail by India. The people of Pakistan are ready to offer any sacrifice and even to eat grass,

to ensure nuclear parity with India."

In view of the dangers of spreading nuclear weapons and aware of the virtual impossibility of guaranteeing the peaceful use of nuclear materials, there are many people who agree that exporting nuclear reactors is wrong. But the question often asked is, once a country gets a reactor, isn't it too late? Is there any point in not selling them uranium fuel?

The answer to that is probably best illustrated by a simple analogy. Is it morally wrong for you to sell a murderer a gun, but morally acceptable for me to sell him the bullets once you've sold him the gun?

A second question frequently asked is: what difference does it make whether we stop selling our uranium if other countries still sell theirs? Don't we just lose money without helping anyone?

First of all, it's important to recognize where that kind of thinking leads us. If we based our individual lives on the idea that if other people are doing something, it must be all right, we might end up as a society of cheaters, thieves, murderers and rapists. Clearly, if we are to live in a sane world then, as individuals or governments, we must base our actions on what we believe is morally right, not on what others are doing.

Secondly, in very practical terms, Saskatchewan has one of the largest single uranium reserves in the world. It almost certainly has the largest reserves in Canada. The decisions we make will have a significant impact on the actions of others.



MAKING DECISIONS ABOUT THE NUCLEAR INDUSTRY

It has been suggested that the decision about whether or not to develop nuclear energy is the most crucial decision mankind has ever faced. The potential for massive effects on the earth and on all creatures which will ever live on it is so great that the responsibility mankind is undertaking is awesome beyond our ability to comprehend. It is therefore a decision which, in every country, should be made with an amazing degree of caution and care.

The decision should be made in the most open way possible, involving as many people as possible, after all the relevant information has been publicly shared and discussed in a way which allows all the implications of the decision to be understood as clearly as possible.

Instead there has been a myth put about that the decision about nuclear energy is a highly technical one. This myth says that only a certain elite group of nuclear experts is entitled to have their opinions taken seriously. "After all," the Rt. Hon. Otto Lang told a delegation of environmentalists last year, "if you were trying to formulate an energy policy for Canada, you wouldn't go and ask the guys at the back of the curling rink for advice."

It is, of course, vitally important that the people who understand the technology should be fully consulted. Indeed, the technical experts have a tremendous responsibility to make the technology understandable to the rest of us. But, when it comes to actually making decisions which will affect all mankind for generations to come, these are moral and political decisions in which the scientists and technologists are just citizens, entitled to vote like anyone else.

In effect, that nuclear energy development has progressed as far and as rapidly as it has in a number of countries is due to the fact that decisions have been made secretly. Information unfavorable to the industry has been withheld from the public. A smooth PR job has been done to allay our uneasiness and to bring scorn on those who question the safety and morality of the industry.

How, one might ask, could such a thing happen in a democratic country like Canada? In our parliamentary system, the necessity for an Opposition is clearly recognized. And yet, in the nuclear question, it is extremely difficult for an effective opposition to

even exist, let alone be heard.

There is a nuclear establishment in Canada, consisting of a number of closely-linked organizations and individuals. It is extremely hard to find nuclear scientists in Canada whose salary and research grants are not procured by organizations which are interested in the promotion of the nuclear industry.

Atomic Energy of Canada Ltd. (AECL) is responsible for both research and development and for sales and promotion of nuclear technology. One can hardly expect such a combination to be conducive to unbiased research and publication—no more than one would expect cigarette companies to do, and then to publicize, research about lung cancer and smoking.

Although billions of dollars of taxpayers' money have gone into AECL, it appears to be accountable to no one. It is the largest research and development group in the country, with a larger research budget than the National Research Council.

The Atomic Energy Control Board (AECB), the government's regulatory and licensing agency, has been intimately related to AECL, with common board members and directors. One of the five directors of AECB was the president of Eldorado Nuclear Ltd., the federal crown corporation which is mining and processing uranium in Ontario and Saskatchewan. Four ex-AECL people are on the AECB Reactor Safety Committee. The staff of AECB is unashamedly pro-nuclear.

Many academic nuclear scientists are tied into this network by research contracts. It is no secret that there are nuclear scientists who do have serious concerns about the wisdom of the nuclear option but who feel unable to speak out because of fear not only of losing their present job, but also of never being able to get another, once having been identified by the establishment as a troublemaker—or by a fear, possibly equally devastating, of losing research grants.

Added to this problem is the fact that Canada has become one of the most secretive societies in the democratic world. Documents which bear strongly on questions of public policy (e.g. safety studies on power reactors currently in operation) are steadfastly kept out of the public domain.

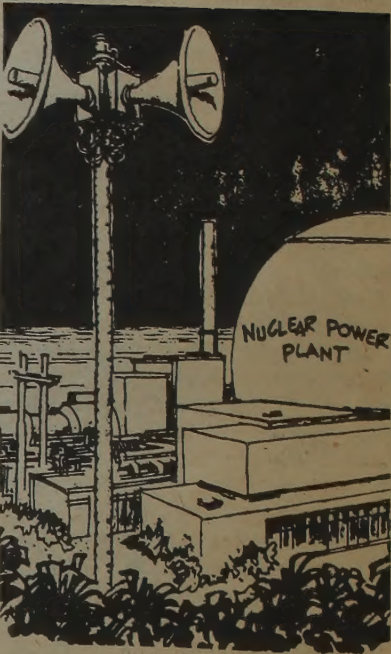
Who knows how many situations

we have in Canada like the one in the United States, where a safety analysis prepared by the Atomic Energy Commission's Advisory Committee on Reactor Safeguards recommended against allowing the Fermi Breeder Reactor to be built.

The report was classified as soon as it was submitted to AEC (the licensing agency), and the building and licensing of the reactor proceeded undisturbed, in spite of the recommendations in the safety study.

Later, the reactor underwent a drastic accident which left it unusable and an environmental disaster which, but for a bit of good luck, would have devastated Detroit. Safety reports for the CANDU reactors operating in Ontario are still secret.

There has been no public national debate in Canada on our nuclear (or non-nuclear) future. Indeed, how can there be when we, the public, have no right to relevant information?



"In case of emergency, repeat after me: Our Father ..."

WHAT IS THE SASKATOON ENVIRONMENTAL SOCIETY?

The Saskatoon Environmental Society (SES) is a non-profit, non-partisan, citizens' organization, founded in 1970 and chartered under the Saskatchewan Societies Act. The group publishes and disseminates information about the Saskatchewan environment and voices particular concern through briefs and direct contacts with people who make the decisions.

In the past, SES has been instrumental in the following achievements:

1971: Better regulation of timber cutting in northern Saskatchewan's forests;

1972: Operation Recycle: province-wide collection and recycling of junked car bodies;

1973: Creation of Municipal Environment Advisory Council by city of Saskatoon;

1974: Prevention of housing construction in riverbank areas of Saskatoon;

1975: Legislation passed for preservation of some historic buildings in Saskatchewan;

1976: Campaign for moratorium and public inquiry into establishment of nuclear industries in the province.

SES has been involved in studying energy issues since 1972. The Society has an active interest in proposals to develop the Churchill and Saskatchewan Rivers as well as in the proposed development of Saskatchewan's other energy resources; non-renewable—coal, oil, natural gas, uranium—as well as renewable ones—sun, wind, biomass

(wood, straw, etc.).

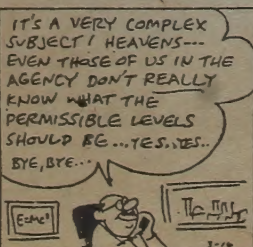
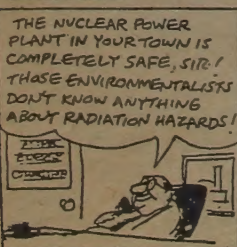
Environmental groups like SES are sometimes accused of standing in the way of progress and being against development of any kind. Nothing could be farther from the truth.

SES is all for healthy development—but we feel that some developments are healthy and some are not. We believe:

- (1) that people in an area affected by a major development should have a voice in decisions that are made;
- (2) that the issue of expanding the nuclear industry in Saskatchewan is a decision of fundamental importance to the future of this province (particularly to the northern part of the province) and the world;
- (3) that the people of Saskatchewan—and particularly the people of northern Saskatchewan—therefore have the right to be informed about the issue, and the right to have an important say in the decision;
- (4) that there are fundamental questions about the nuclear industry that are not going to be raised by the industry which we have a responsibility to raise and make people aware of.

The purpose of this publication is to provide information that is essential to forming an opinion on nuclear development. We would also encourage people to make their opinions known to those who will be making the decisions for us on this crucial issue.

CAPITOL GAINS



by James Stevenson

CAPITOL GAINS by James Stevenson

Washington Star 3/16/76

INTERNATIONAL OPPOSITION GROWS

Throughout 1976, the international opposition to nuclear power has mounted rapidly and the controversy received an increasingly extensive coverage by the media. The nuclear industry's problems ranged from massive demonstrations and sit-ins to sombre but equally damaging court rulings on key nuclear questions.

Late in 1976, the U.S. industry was thrown into confusion by a court ruling that environmental impact statements must contain detailed information on such matters as waste storage and the scope for energy conservation. The ruling, which followed petitions by nuclear critics, led to a rash of legal actions seeking re-examination of the licenses of at least half the reactors in the U.S.

In Western Europe, opposition has been expressed recently in very large protest demonstrations at nuclear sites. Throughout the summer, the proposed site of the Super-Phenix breeder reactor near Lyons, France, was occupied on weekdays

refused to allow nuclear development, will hold a referendum before any new decision is made.

Nearby, in West Germany, nuclear opponents have followed on their success at Wyhl in 1975 by focussing on the problem of waste reprocessing and storage as well as reactor safety. Late in September, protestors established a tent village on a proposed reprocessing site. Two months later, 25,000 people from all over Germany, demonstrated at a reactor site at Brokdorf. Not surprisingly, *Nucleonics Week* described the German anti-nuclear campaign as "an environmental protest of unprecedented proportions".

In the U.S. and Europe, rising concern over the power of the corporations to subvert the normal workings of democracy has led some nuclear opponents to engage in more aggressive action against nuclear facilities. For example, in August, almost 200 people were arrested at a demonstration at the site of the proposed Seabrook reactor in the

lesser extent, economic difficulties, have combined to cause the Japanese nuclear program to be cut back by about 50 per cent.

But the nuclear debate is not only raging in the capitalist countries. In the U.S.S.R. the nuclear issue is being fought out in the public arena. To date, the main participants are scientists, but there is known to be a significant level of concern amongst the lay public.

Perhaps the fiercest Soviet critic is one of the country's most eminent scientist, Professor P.L. Kapitsa. Kapitsa, who is often called "the grand old man of Soviet physics", was the founder of the Institute of Physical Problems in Moscow. In the last year he has spoken out several times on the problems of wastes, reactor safety, weapons proliferation, and nuclear terrorism.

GERMAN COURT STOPS NUCLEAR REACTOR

"West Germany's atomic energy industry has been dealt a major blow by a independent administrative court in Freiburg which has imposed a building ban on the controversial nuclear power station project at Wyhl, in Baden-Wurttemberg.

"The decision, which came after the first court case of its kind in West Germany, is expected to have far-reaching repercussions, and might further delay the start of other new atomic power stations.

"The ban was imposed on the grounds that a 'nationwide catastrophe' might result from an explosion in the reactor's pressure vessel. Steel fragments could penetrate the outer safety container and release masses of radioactive material.

"Thousands of people could be killed, and hundreds would suffer

not be completely ruled out.

"The court said that if it was not possible to install adequate safety precautions for a 1,350 megawatt reactor, the alternative was smaller reactors.

"The state government of Baden-Wurttemberg said it would appeal against the decision. Precautions against the bursting of a pressure vessel had never been demanded before, and it was up to the Bonn government to make a political decision.

"The cost of installing precautions against the bursting of a reactor vessel is estimated at between 300 and 400 million marks (up to 200 million dollars).

"The court, which sat for 12 days, listened to over 50 international experts on nuclear energy. The case was brought by six local authorities

"The ban was imposed on the grounds that a 'nationwide catastrophe' might result".

long-term health damage. The greater the potential damage from an explosion, the better the safety precautions have to be. Although such an explosion was unlikely, it could

and by ten individuals."

(Reprinted from the Manchester Guardian Weekly, Vol. 116 No. 12, March 20, 1977)

SOUTH AUSTRALIA BANS URANIUM MINING

Premier says State has a moral duty not to create a monster

The State of South Australia has decided not to allow the mining and enrichment of uranium in the state, and it will oppose uranium exports.

This major policy decision was announced March 30, 1977, in the state parliament by Premier Dunstan. It means an end to plans for an uranium enrichment plant and for development of the state's proven uranium reserves.

Australia has some of the world's largest proven reserves of uranium but there has been widespread controversy as to whether it should be mined and exported.

The former federal Labour Party government had suspended exports of uranium pending the outcome of the Fox Inquiry—a multi-year, in-depth study of the local and global implications of nuclear development.

The current federal Liberal Party government has closer ties with the international mining industry and has recently announced it would resume exports.

South Australia's Labour government has taken a firm stand against uranium exports. (An Australian state government is similar in power and jurisdiction to a provincial government in Canada.) According to an article in *The Australian* of March 31, 1977, the South Australian state premier, Mr. Dunstan, said that despite compelling economic reasons for the export of uranium, especially to Japan, his government "had a moral duty to mankind to ensure that it did not create a monster by providing uranium to customer countries."

His government's policy was not to allow mining and treatment of uranium in South Australia unless and until it was safe to do so.

"There would almost certainly have to be very marked changes in technology and stringent international controls over the use of uranium and the disposal of high-level radioactive wastes before we would reconsider our policy," he said.

The decision was the result of detailed assessments made by the Premier's policy secretariat and the Mines Department.

Mr. Dunstan said: "It has not been an easy decision to make. We are very concerned about the economic future and the effect on our major trading partner, Japan.

"But we do not feel satisfied in our minds that uranium mining, enrichment or export is safe, and therefore we cannot take what

aspects of uranium mining and export is the disposal of nuclear wastes. "I don't see that Australia should be host to atomic wastes and quite plainly Japan is not happy about disposing of wastes."

Japan had obviously chosen to rely on nuclear power as its main source of energy and there were compelling arguments for providing it with uranium. Some of the risky issues were the security of transporting and long-term use of uranium

GOVERNMENT "has a moral duty to mankind to ensure that it does not create a monster by providing uranium to customer countries."

appears to be an enormous risk."

Mr. Dunstan said an urgent task was the development of alternate sources of energy. His government was now formulating long-term policies in this respect.

One of the most dangerous

overseas, the safe operation of reactors and uranium waste disposal.

"Examination of these problems only lead one to conclude that, for us to provide uranium to customer countries, there must be stringent policing for more than the foreseeable future."

AUSTRALIA: CHURCHES, UNIONS JOIN IN CALL FOR HALT AND PUBLIC DEBATE

Australians are sitting on more than 300,000 tonnes of uranium. At current prices, this uranium could provide bonanza profits for the companies which have found uranium deposits. Not surprisingly, these companies are pushing for quick development. But despite the Australian government's recent decision to allow full-scale mining to go ahead, the widely-based opposition movement that has grown up over the last two years continues to gain support.

This growing opposition is largely motivated by a profound concern at the wide range of hazards associated with the projected use of the uranium as a fuel for electricity generation. It is also based on concern about the adverse local effects which would be likely to result directly from uranium mining itself.

"nationwide railway strike in support of workers who were fired for refusing to handle uranium."

Native Land Claims

The original concern was for the land rights of the Aborigines—Australia's native people. One of the first steps of the Labour Party when it came to power in the 1972 Australian national election was to appoint an inquiry into Aboriginal land claims.

The Aborigines' plight was neatly summarized in March 1974 by a writer for the Melbourne Age: *Already their tribal grounds have undergone a brutal and often unnecessary desecration by the bulldozer and implements of a sophisticated exploration exercise. No cash value can be placed on the importance to them of their religious symbols. A major mining development offered them nothing but the transformation into an all too familiar group of unhappy fringe dwellers.*

In August 1976, the Oenpelli Tribal Council made a final submission to the Ranger Inquiry. This submission told the commissioners unequivocally that "if Oenpelli had the power to make the final decision, it would oppose mining."

Global Issues

The land claims question—combined with events elsewhere in the world—sparked growing concern in Australia about the wisdom of nuclear development.

In March 1975, the Minister for Environment told a meeting in Geelong that nuclear energy created "the most dangerous, insidious, and

persistent waste products ever experienced on the planet" and that it was "futile to seek salvation from the energy crisis through the development of nuclear energy."

By May 1975, the government was convinced that a detailed inquiry should be held. The inquiry was to focus on the uranium mining proposals of Ranger Uranium Mines, but also examine the broader questions posed by nuclear development.

On November 11, 1975, while the Ranger Inquiry, headed by Justice Fox, was hearing evidence, the Labour government's term of office was unexpectedly and abruptly terminated. The incoming Liberal government was not at all interested in further delay and ordered the Inquiry to report by June 1976.

However, the Commissioners were not prepared to terminate their proceedings prematurely, and refused to comply.

Instead, Justice Fox's Commission decided to issue their report in two stages: the first dealing with the global issue and the second with local effects. (See *The Fox Report*.)

Churches

The Australian Council of Churches was quick to welcome "the open and honest discussion of the serious risks and disadvantages associated with the various operations of the nuclear power industry" in the *Ranger Uranium Environmental Inquiry First Report*.

On October 17, 1976—just days after the report was issued—the Australian Council of Churches un-

animously passed a resolution calling for "a five-year moratorium on the mining and exporting of uranium to allow sufficient time for . . . public debate and for further research into the risks involved and possible alternate energy sources."

Trade Unions

The Australian trade union movement has also extremely concerned about the nuclear issue. They also have a long history of using their strength in pursuit of social goals beyond the traditional areas of wages and working conditions.

In April 1976, they combined these elements in a nationwide railway strike in support of workers who were fired for refusing to handle uranium.

In the case of uranium, they have clearly indicated to the national government that unless a thorough-going national public debate is held

before any further uranium mining is allowed, they are prepared to recommend that "all union members involved in uranium mining be withdrawn, that union members refuse to supply uranium mining ventures and that union members refuse to handle uranium ores or products for export."

Opposition Party

The Labour Party (Australia's national opposition party) has taken a solid stand in favour of full public debate. In November 1976, they took an even stronger position, announcing that if re-elected as the government they "will not be bound by any contracts entered into by the present government."

Not surprisingly, this position has the international mining industry a little worried about their investments in vestments in Australian uranium.



THE FOX REPORT

Justice Fox's first report, released in October 1976, came to the following conclusions, based on an extensive examination of the major nuclear issues:

- * There is at present no generally accepted means by which high level waste can be permanently isolated from the environment and remain safe for very long periods.
- * It seems doubtful whether, as the number of facilities increases, it will be possible to provide sufficient defences to render every installation safe against attack by even small numbers of well-armed trained men.
- * There is a very real risk that the opportunity and the motive for nuclear blackmail will develop with time. The evidence indicated that the risks are presently real and will tend to increase with the further spread of nuclear technology.

* The nuclear power industry is unintentionally contributing to an increased risk of nuclear war. This is the most serious hazard associated with the industry.

* . . . it is incorrect to suggest that there are energy impoverished nations which need Australian uranium for survival. . . .

* . . . it is incorrect to suggest that there are energy impoverished nations which need Australian uranium for survival. . . .

* . . . it is in Australia's best interests to encourage and assist the world community to do whatever is practicable to avoid, or where unavoidable to control, the development of inescapable reliance on nuclear power.

* . . . reserves of uranium would amount to about 5 per cent of presently estimated fossil fuel reserves.

* . . . renewable energy sources, particularly solar energy in its various forms, seem likely to make important and growing contributions to total energy requirements.

* Policy respecting Australian uranium exports, for the time being at least, should be based on a full recognition of the hazards, dangers and problems of, and associated with, the production of nuclear energy, and should therefore seek to limit or restrict expansion of that production.

By far the most important recommendation, however, was, "that there should be ample time for public consideration of this Report, and for debate upon it" and "that no decision be taken . . . until a reasonable time has elapsed and there has been an opportunity for the usual democratic processes to function."

Acknowledgements

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The other articles in this tabloid were written by members of the Saskatoon Environmental Society (SES): Box 1372, Saskatoon, Saskatchewan, S7K 3N9. Phone (306) 665-6655.

ENERGY NEEDS: DO WE HAVE A CHOICE?

Some people say we need to use more energy, others say we don't need to use as much as we do now.

Some people say we need nuclear energy, others say we don't need nuclear energy.

Some people say solar and other renewable sources of energy can fill all our energy needs, others say this just isn't possible—at least for a long time—or is too expensive.

It is easy to talk loosely about energy needs, but what are they? And what, really, is energy?

Understanding energy

Energy, or power, is the ability to get things done. So, the first question to ask is what needs to be done. The ways in which we make use of the energy we produce are called end uses of energy.

About one-half of our energy is used as low temperature heat. This need is now filled by precious fossil fuels and can easily and economically be met by direct solar energy in the future. It makes no sense to burn coal or split uranium atoms in a power station at very high temperatures to produce steam to drive turbines to drive generators to produce electricity which has to be transmitted through long transmission lines to your house to power baseboard heaters which keep your house at 70°F. Not only is most of the energy in the coal or the uranium (more than 70%) lost in the process, but it is also a very complicated and expensive way to heat your home.

Thirty percent of our energy is used in transportation, in the form of gasoline, kerosene and diesel fuel, all derived from petroleum. Eventually, as petroleum runs out we will have to replace these oil products with other liquid fuels such as alcohol derived from renewable forest products (wood wastes), garbage, and other organic materials. These are collectively referred to as biomass. Again, it makes very little sense to switch over to the use of complicated and expensive electric systems if alternative liquid fuels will be readily available. The only major exception would be electrification of the railways.

It is estimated that all the end use needs of energy which can only be met with electricity (these have been called "obligatory electric"), such as radios, or which are very conveniently met with electricity, such as household appliances and electrified railways, amount to about 10-15% of our total end-use energy needs. The now installed and planned Canadian hydro-electric generating stations are sufficient to meet all our needs for electricity. We don't need nuclear power stations for this purpose. As we said before, all our other end-use energy needs do not require electricity and are more easily and more economically met by other renewable sources.

Efficiency

Efficient utilization of energy involves the use of appropriate grade energy sources to fill equivalent end uses. Using high grade electricity to heat a house is like cutting butter

with a chain saw. The efficiency has to be measured, not where the electricity comes out of the outlet in the wall, but at the generating plant where two-thirds of all energy is lost as waste heat. Transmission losses reduce the efficiency even more.

Energy needs

It has been said that the world needs nuclear energy and that it is needed now. The people promoting nuclear energy would have us believe that if we don't let them build nuclear power stations, we will soon freeze in the dark. Let's look at the need for nuclear energy in various parts of the world.

Saskatchewan. The Saskatchewan Power Corporation (SPC) has about 2,000 megawatts of generating capacity. There is approximately an equal amount of undeveloped generating potential on the Saskatchewan River system. It's enough to meet all our foreseeable electricity needs for a long time into the future, if we use electricity wisely—that is only for the purposes for which electricity is really needed. Saskatchewan also has very substantial coal reserves and, although not really needed, some of that coal could be used (and, in fact, some of it now being used) to produce electricity. Recognizing these realities, it is not surprising that the provincial government has stated that nuclear energy will not be needed here for a substantial time into the future.

Canada. In mid-1971, the then Minister of Energy, Mines, and Resources, the Honourable Joe Greene, stated before the Canadian Institute of Mining and Metallurgy that Canada had 932 years of natural gas and 390 years of oil left in the ground. Now, Canadians are told that we have only nine years of proven conventional oil reserves and only fifteen to twenty years of proven gas supplies.

There is a pretty good indication that both the high and the low estimates are wrong. In 1971, the oil companies found it profitable to export oil and gas from Canada to the United States and they persuaded the Canadian government to let them increase exports by painting a picture of seemingly endless reserves—surplus to Canadian needs.

A recent United Nations report estimated world reserves of oil and natural gas at about 100 years

A few years later, after the so-called Arab oil crisis, when the oil companies wanted to get permission to develop arctic gas and oil, they suddenly turned around and predicted rapidly disappearing reserves of oil and gas. This kind of manipulation of reserve figures with a view to influencing government policy in favour of the oil companies' profits is not limited to Canada. It has, for example, been well documented in the United States.

The real reserve figures may well lie somewhere in the middle. A recent

United Nations report estimated world reserves of oil and natural gas at about 100 years at current rates of consumption. This is not to suggest that we should continue to use oil and gas wastefully, as if there were no end to them. It is not claimed that oil and gas will not become increasingly expensive to develop. It is simply suggested that there is more oil and gas than the oil companies would like us to believe; that we don't have to be pushed with indecent haste into accepting nuclear energy as inevitable; and that we have sufficient time to develop a society completely dependent on renewable sources of energy.

What do we use energy for?

End use	Present source	Grade of end use energy
51% low temperature heat (below 148°C) space & water heating; low temperature process heating	mostly (over 90%) fossil fuels, some electricity	low grade
8% high temperature heat (above 148°C) industrial processes; smelting, etc.	fossil fuel or electricity	high grade
30% transportation	liquid fossil fuel	high grade
7% electricity	electricity	high grade
4% obligatory electrical: lighting, radio, TV, telephone, electronics, home appliances, electro-metallurgy, electro-chemistry, welding	electricity	high grade

All predictions that oil and gas supplies are about to run out in the next few years are based on the assumption of rapidly growing consumption. There is evidence now that not only is consumption of oil and gas in Canada not growing as rapidly as predicted—it has also been shown that it is to the advantage of every Canadian to invest our energy dollars in conservation rather than in new large-scale energy supply developments. A study by the Science Council of Canada shows that it costs four times as much to develop one unit of energy supply as it costs to reduce energy demand by one unit. Other studies show that investment in conservation (e.g. home insulation) creates more jobs than investment in large capital-intensive energy supply developments.

The federal government has rather belatedly recognized this and is now starting to promote —

tist from the United States, who recently completed an energy analysis for the U.S. government, was quoted in Science magazine this year as saying that the United States did not really need nuclear energy until the year 2010.

What about the countries of Western Europe and Japan, which depend very heavily on Arab oil imports? If we just remember the U.N. report which estimates world oil and natural gas supplies in the order of 100 years worth, we don't have to worry that Western Europe and Japan will freeze in the dark because the physical supply of these fossil fuels is running out. Furthermore, the

world has very large coal reserves which could tide them over for a very long period if renewable energy sources didn't come on line as quickly as anticipated, or if we decided to bring them in more slowly.

The other argument that has been advanced is that these countries want to develop nuclear energy in order to become economically independent of the Arabs. Experience of the last few years shows that the power of the Arab countries over Western Europe and Japan is much exaggerated. For example, it was just recently reported that Japan had a record trade surplus last year—in spite of its almost total dependence on imported oil. Besides, why would any country want to trade dependence on the OPEC cartel for dependence on the uranium cartel?

Third World. Nuclear power is what the poorer countries need like we need another hole in the head.

First, nuclear power is very expensive. Using it would put less well-off or third world countries, as they are often called, further into debt than they already are.

Second, nuclear power is a very complicated technology; it makes third world countries dependent on continued supplies of spare reactor parts and technical support, in addition to buying supplies of uranium fuel.

Third, large centralized nuclear power stations are an inappropriate technology for countries with large decentralized rural populations which have a need for small-scale simple technology. Nuclear energy is electrical energy and therefore totally unsuited to countries where there are no electric grids and houses have no electric outlets.

Continued →

Other developed countries. Alvin Weinberg, a senior pro-nuclear scien-

THE ALTERNATE OPTION: OUR RENEWABLE ENERGY RESOURCES

There is much evidence that both here in Canada and in the world as a built and maintained by individuals or small communities.

Solar heating is already a practical alternative for saving both energy and money.

whole, we have at least twenty years to develop new ways to meet our energy needs—even without nuclear energy. This is a very critical period for our society. It is imperative that we come to understand the choices available to us.

At the present time, the bulk of our energy is supplied by fossil fuels: oil, natural gas and coal. By their very nature, these substances are limited in quantity. Uranium, the resource that has been heralded as the energy source of the future, is also available in a limited amount—probably less than fifty years worth.

There are a number of renewable energy sources which, if fully developed, could greatly reduce if not end our dependence on energy sources that will run out. The Table *Energy That Lasts Forever: What's Ready to Use Now* lists the renewable sources that have been identified and some strategies for their use.

Renewable energy sources have many advantages. They use on-going natural processes which are well studied and understood. Most, like the sun, wind and tides, don't run out. That makes price increases which result from increasing scarcity less of a problem. There are fewer adverse environmental impacts associated with their use.

This is particularly true in the case of methane gas generation from feedlot wastes and sewage effluent. These potential pollutants can be turned into useful fuel to run cars, trucks, or farm equipment, and the remaining slurry is a valuable organic fertilizer. Renewable energy sources tend to be more evenly distributed over the earth's surface than fossil fuels or uranium. Many of the schemes for their use involve relatively simple technology that could be

Some renewable energy sources are already being used. We are most

Hydro-Quebec. The generator will be connected to the island grid where it will operate as a fuel saver for the generators currently supplying electricity. The cost of the electricity produced from subsequent units when they are added to the system is expected to be 3.45 cents per

solar system, added in 1971, costs less than \$2,000, not including Hoffman's own labour. The system provides 50% of his yearly home heating requirements as well as considerable heat for hot water. Since that time, many private and research homes have been built. Solar heating is already a practical alternative for saving both energy and money.

Geothermal energy in the form of dry and wet steam and hot water are being used in Iceland, Italy, Japan, Mexico, New Zealand, the United States, and the U.S.S.R. to generate a total of 1,200 megawatts of electric power. The hot water is also being used for space heating and industrial purposes. Research into using this source of energy in the Regina area has just started.

Despite these encouraging signs, there is relatively little attention or money given to renewable energy research in this country. In the 1976-77 Federal energy and research budget of \$128 million, about 75% went to nuclear energy, while renewable energy research received less than 2%.

Nuclear research has been heavily funded for thirty years, yet its contribution to our current energy supply is small. (In Canada, nuclear energy currently provides just slightly more of our energy supply than burning wood.) Amory Lovins, American physicist and author living in Britain, has described two paths of energy use. The 'hard' path, which is typified by nuclear energy, relies on a few very high level technologies which are made vulnerable by their great expense and susceptibility to sabotage and accident. The 'soft' path, where the majority of renewable resource technology belongs, has a diverse array of relatively inexpensive, low technologies spread over a wide geographic range and thus offers a good prospect of stability under a wide range of conditions. The time has come for us to explore the 'soft' path.

ENERGY THAT LASTS FOREVER WHAT'S READY TO USE NOW

Low Grade Solar Heat flat plate or vacuum tube solar collectors producing heat less than 148°C (300°F)				
High Grade Solar Heat from intense concentrated light for industrial processes or to run electrical turbines*	✓	✓		✓
Photovoltaic Conversion solar cell collectors*	✓	✓		✓
Wind Generated Electricity*	✓	✓		✓
Biomass Energy crop and livestock wastes, municipal waste, logging residues and crops grown specially to produce biomass	✓	✓	✓	✓
Hydro Power	✓	✓		✓
Tidal Power	✓	✓		✓
Wave Energy a form of indirect wind energy used to generate electricity*	✓	✓		✓
Ocean Thermal Gradients heat engines tapping heat in the ocean to make electricity*	✓	✓		✓
Geothermal Energy steam and hot water heated from the depths of the earth	✓	✓		✓

Residential electrical heating	Commercial electrical heating	Transport liquid fuel	Industry electrical heating
	✓		✓
✓	✓		✓
✓	✓		✓
✓	✓	✓	✓
✓	✓		✓
✓	✓		✓
✓	✓		✓
✓	✓		✓
✓	✓		✓

* Hydrogen gas can be produced from electricity and used for residential, commercial and industrial heating as well as in the form of a liquid fuel for transportation.

familiar with hydroelectric power which supplies a significant proportion of our electricity in Canada. Electricity can also be produced by wind generators. A 200 kilowatt wind generator designed by the National Research Council has been built on the Magdalen Islands by

kilowatt-hour. The current price for the diesel-generated electricity is 28 cents per kilowatt-hour.

Examples of solar heating systems can be found in many countries. Canada's first solar home was built in 1968 by Eric Hoffman near Vancouver, British Columbia. The

Continued

It is no wonder that the World Bank refuses to lend money to developing countries for the purchase of nuclear reactors. It considers such purchases uneconomic. Nuclear power, instead of solving the problems of the vast rural populations of the third world, exacerbates them. Instead of providing for basic human necessities in these areas—such as food and shelter, produced locally—it draws people from the land into the cities where, unable to find jobs, they are condemned to live in slums. Third world countries, like India, can no more afford to destroy their strong rural agricultural base than can Saskatchewan. India can no more forget about farmers in its rural areas than we in Saskatchewan can forget about our farmers. It is very questionable how we could "help" the third world by destroying their rural agricultural base.

SOCIAL EFFECTS OF LARGE-SCALE TECHNOLOGIES

Technologies shape social institutions. The use of large-scale, complex, dangerous energy systems such as nuclear fission and coal conversion affects more than just energy matters. Such installations can easily lead to concentrations of political and economic power, as well as to curtailment of individual freedoms and the democratic process.

A recent Rockefeller Brothers Fund report (*The Unfinished Agenda*) listed the following "unavoidable consequences" of these kinds of energy technologies:

— compulsory governmental diversion of scarce resources (capital, skills, labour, special sites, water, etc.) from other priorities into the energy sector;

- a need for a central authority (often federal) to impose big energy facilities and their perceived risks on people who want neither;
- conflicts between central authority (often federal) and local autonomy in all energy matters;
- concentration of political power, enabling urban people to obtain the benefits of the energy while unequally pushing off the associated social costs onto politically weaker rural minorities;
- a tendency to make patterns of energy end-use conform to the needs of the source of supply rather than to people's needs;
- encouragement of large

- monopolies;
- isolation and alienation of energy users from the unaccountable elite who supply, price, and regulate the energy;
- commitment by the political authority to support the continued uses of the energy system regardless of any inherent faults, and hence to suppress dissent—or use social engineering to bypass dissent—even in the case of major accidents or technical failures;
- development of strong central bureaucracies and technical establishments that favour the technologies they develop and come to dominate decisions about their use.

NUCLEAR DEVELOPMENT AND NORTHERN SASKATCHEWAN

The nuclear issue in northern Saskatchewan is intimately entwined with development economics: jobs, training, resource extraction, technology, export-import ratios, and so on. The critical questions are: What kind of development? For whose primary benefit? And with decisions being made by whom?

Jobs

During the first phase of the Bayda Commission hearings, the Department of Northern Saskatchewan estimated that 60-70% of the jobs at the proposed Cluff Lake mine would go to northern natives. This seems to be clearly fantasy, however, since Amok Ltée itself estimated the upper limit to be just over 30%. Their consultants suggested that a more realistic figure would be 20-25%.

The issue of employment is critical in a situation where unemployment is high and the nuclear industry is holding out the proverbial carrot by offering jobs. Though the number of jobs that might be available to native northerners is low (a maximum of 66 in Phase I at Cluff Lake), Amok's promotional campaign has ten times that number of people chasing 'the carrot'—hoping to get work.

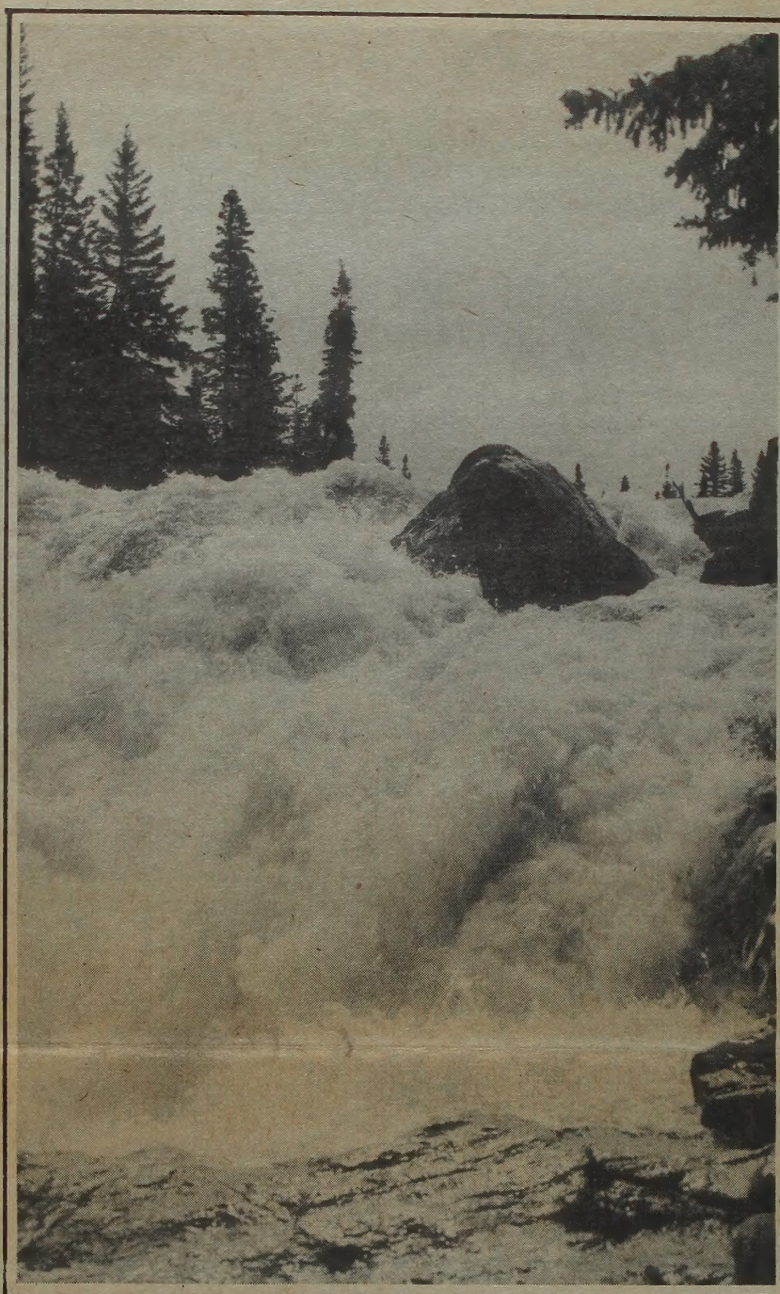
A good guide to prospects for native employment can be found at the two existing uranium mines. No specific figures are available for the Eldorado Mine, but after 25 years of operation, it is generally agreed that the number of natives employed at the mine is very small. At the Rabbit Lake mine, about 18 northern natives are employed out of a total of more than 200 workers. With this past experience, it's not surprising that northern native people are skeptical when claims are made that uranium mining will be the solution to northern unemployment.

The concern for employment, however, is not just a question of how many but also what kind of jobs. The jobs that Amok has identified as likely to be filled by northern natives are the least-skilled and lowest paid ones.

Finally, governments at all levels have a responsibility to their communities and people to make sure that any risks to health and life are well-known to anyone who might be employed, and their families. The fact that the risk of lung cancer can be twice as high for uranium miners has unfortunately been obscured, however, under a barrage of information about income and royalties.

Royalties

Much has been said about the huge royalties that will come in from uranium mining. (The possibility that there won't really be any major royalty income even if the project goes ahead is discussed elsewhere in this newspaper.) But northern people have some questions about royalties. How much of the royalties will be spent in northern Saskatchewan? How much control will northern people have over how the money is spent? Why should they believe that



any promises made on uranium royalties will be any better kept than past promises on land treaties? Indeed, as the Northern Municipal Council has pointed out, the actual situation regarding royalties for a northern tax base doesn't really offer much at all; the main benefits and controls will be outside of northern Saskatchewan.

Economic Development

The third major issue is the type of development that will be best for the north. Everyone is in favour of

provide considerable employment based on a combination of traditional and modern lifestyles.

What is the problem?

A major dimension is historical. For hundreds of years, the north has been an economic colony of outside companies—much like western Canada has been of eastern Canada and the United States. Companies extract resources from the north for processing elsewhere and ship back finished goods (food, clothing and building materials) for sale at high prices. At the same time, local

At the Rabbit Lake mine, about 18 northern natives are employed out of a total of more than 200 workers.

economic development, but there is great disagreement about what kind of development should be promoted.

Ideally, northern native people would like to develop and maintain a northern economy based upon their own way of life. In reality, the north can be self-sufficient in materials for housing, in food, in fuel and local hydropower, with enough extra to trade for necessary vehicles, building materials, foods, clothing, etcetera which do not have northern sources. Such an economy would likewise

(FSI) and the Association of Metis and Non-Status Indians of Saskatchewan (AMNSIS) are similarly committed to northern self-determination, with variations consistent with local decision-making.

In the case of uranium, it appears that the multinational corporations, the Department of Northern Saskatchewan, and the federal government have been planning for some time without local consultation, let alone local decision-making. It is only at the eleventh hour that northern people have been brought into the process—to give their opinion not on whether development should go ahead, but rather on whether to have, in the case of the Cluff Lake mine, a live-in community or a commuter system.

The jobs and minimal royalties offered to northern people have certainly gained support for the project from a number of people. At the same time, some people are angry about how far Amok has proceeded without people having more than a hunch that "something is going on." Some people in the north have done some research and realized that Cluff Lake and operations like it will actually colonize the north even more—unless northern people take some effective action.

Questions such as reactor safety, dangerous waste accumulation, and nuclear proliferation are very distant from northern concerns. The effects of the actual and proposed uranium operations on hunting, trapping, fishing and forestry are immediate, and prompt the urgent demand to settle land claims and aboriginal rights first, as a fundamental basis of development.

On the weekend of August 6-7 this summer, over 500 northern native people gathered at Palmbere Lake (north of Buffalo Narrows, on the road to Turnor Lake) to discuss the proposed Cluff Lake operations in the light of aboriginal and treaty rights. Among the resolutions adopted unanimously were:

- (1) opposition to Cluff Lake plans;
- (2) settlement of native land claims must precede all large development;
- (3) immediate establishment of technical training facilities to increase northern vocational opportunities and begin providing long-range employment programs based in the north and serving northern people.

There are many examples around the world where people have achieved self-determination, and are capable shaping their own economic development in appropriate technology and employment. It is much too soon to know whether the present determination of northern people will succeed in the face of considerable opposition from external powers—that-be. But in the balance between money and power on the one hand and wisdom and justice on the other, we must certainly trust that northern people in their actions for self-determination will be striving to meet not only their own needs but also as a by-product, ours as well.

decision-making and moves toward self-determination are thwarted by powerful forces external to the north.

Self-determination

At the end of June, the Northern Municipal Council held its convention in Prince Albert. Delegates unanimously endorsed self-determination as the basic principle of northern development, especially with emphasis on the needs and decision-making powers of northern people of native ancestry. The Federation of Saskatchewan Indians

URANIUM: ROYALTY BONANZA OR WHITE ELEPHANT

The main issue of nuclear development facing Saskatchewan is whether we should allow any further uranium mines to be built in northern Saskatchewan. The major benefit that has been predicted for the province is substantial resource royalties. All predictions of major resource royalties from uranium are based on uranium prices of \$30-40 per pound. Before the establishment of a uranium cartel in the early 1970's, the price was seldom more than one-third this amount.

According to officials of the provincial Department of Finance, the break-even point for the province is about \$15 per pound. Below this price level, the provincial government would get very little, if any, revenue from uranium mining.

On the other hand, uranium development—like anything else—is sure to cost the province something. The costs are hard to pin down, but a few have already been identified. The most obvious is an all-weather road to Cluff Lake. The province is slated to pay half the \$7,000,000 estimated cost, although independent consultants reported that the road would mainly benefit the developer, Amok.

A less obvious cost is the management of radioactive tailings produced by the proposed mine. These will remain dangerous for about 100,000 years during which time they will have to be regularly monitored to ensure they are not contaminating the surrounding land and water. Amok intimated that this cost will ultimately have to borne by the taxpayers of Saskatchewan.

A third major cost identified by the Bayda Commission hearings is the increased demand on social services.

"Amok needs only 150 truckloads of yellowcake to pay off its investment."

that will result from further disruption of the lives of northern natives. Increased alcoholism, crime, family difficulties, inflation and erosion of native languages and culture are all likely to be associated with further uranium development according to consultants hired by the Commission.

Uranium, like many other minerals, has had its periods of boom and bust. In the early 1950's, there were many who predicted that uranium would be for Saskatchewan what oil had been for Alberta. It didn't work out that way. Throughout the sixties and early seventies, the uranium industry in Saskatchewan has had tough going.

It is not surprising that many people in Saskatchewan's uranium industry reacted enthusiastically when uranium prices shot up three years ago. And were this "just another industry," it would be only natural that the provincial government would look forward to continuing high prices which would provide substantial royalty income.

But is this "just another industry?"

And will this boom last any longer than the first boom in the late forties and fifties?

As the insert, *Nuclear Energy: A Booming Business*, suggests, there are many reasons to think not. Even at present the prices of \$30-40 per pound for uranium, on which the provincial government bases its predicted royalty bonanza, are "spot" prices—current open market prices for very small amounts. Average contract prices, which are the real prices paid for significant amounts of uranium, range between \$13 and \$20 per pound—depending on year of delivery.

A leading American economist, Dr. Vincent Taylor, who specializes in uranium price and supply, has estimated that "uranium prices could decline to levels below \$10 per pound and remain there through the first quarter of the twenty-first century."

Amok, controlled by a consortium of several large French multinational mining corporations, needs only 150 truckloads of yellowcake to pay off its investment. If the price of uranium drops three years from then, Amok will already have made huge profits.

But what about Saskatchewan? We could be left with a project that would cost us substantial amounts of money for the road, care of the leftover radioactive wastes, and social services for northern people whose livelihood and lifestyles might easily be disrupted by the development. And a project that would have given the people of Saskatchewan little in financial return before the bottom dropped out of the uranium market.

This may not happen, but in

weighing the temptations of huge royalty revenues Saskatchewan people must also consider the possibility that what we will get is not lots of money, but rather a white elephant.

In Dr. Taylor's opinion, "the stage has already been set for another cycle of boom and bust in the uranium industry and the major challenge now confronting the government is to minimize the harmful effects of the approaching downward leg of the cycle."



"WE'RE GOING TO BLOW UP YOUR YARD . . . INTERESTS OF SCIENCE, AND ALL THAT . . . DON'T HAVE TIME TO TALK RIGHT NOW . . . CONGRATULATIONS . . ."

NUCLEAR ENERGY: A BOOMING BUSINESS?

Is nuclear energy going to be a booming business throughout the world during the next fifteen years?

There are many reasons to think not. In the last four years, reactor orders in the United States—the major world market for uranium—have declined from 36 in 1973 to 27 in 1974, 4 in 1975 and 3 last year (1976). A senior energy official of the Carter administration is quoted in the *Leader-Post* (Regina, August 31, 1977) as saying the U.S. utilities would order no more than five new nuclear reactors for domestic use in the next five years. This compares with earlier estimates of about 30 each year.

Besides the United States, the other countries with major plans to use nuclear energy were the Soviet Union, Britain, France, West Germany, Spain, Italy, Japan and Canada.

The Soviet Union's Five Year Plan called for nuclear energy to supply 8% of total electrical output by 1975, however, the contribution of increased nuclear development did not top 2%.

In Britain there have been no orders for new reactors since 1971. The two publicly-owned power utilities already have 40% more electrical generating capacity than they need.

France's nuclear program has been reduced twice, and there are doubts that even the newest low estimate will be met.

A West German court recently ruled against a highly controversial proposal to construct a nuclear reac-

tor at Wyhl on the basis that "a nationwide catastrophe" could result from an explosion in the reactor's pressure vessel—an accident the court judged to be a distinct possibility.

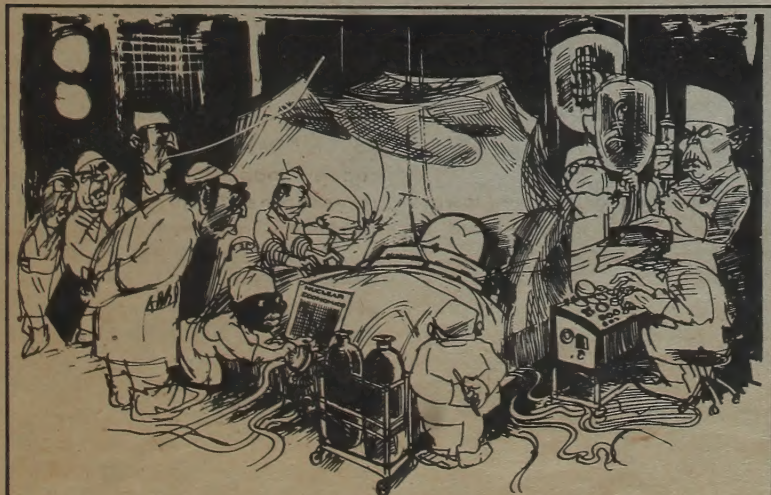
Spain planned to have twelve nuclear power plants by 1980, but has yet to sign the contracts with Westinghouse.

Italy's target was twenty nuclear power plants by 1985, but only twelve are even under discussion in the Italian parliament.

In Japan the nuclear program has already been cut back by 50%, and there are growing doubts that even this lower figure is a realistic target.

In Sweden, nuclear energy was a major issue in the most recent general election—the party that opposed further nuclear development is now the leading party in the new government. A commission whose mandate includes looking into the possibility of phasing out Sweden's existing nuclear reactors has recently been appointed.

Here in Canada, at least a quarter of the number of planned reactors were to be built in the Province of Quebec. But, according to an article in *Macleans* (June 27, 1977), Quebec will soon announce its intention to defer construction of nuclear reactors indefinitely. This move by Quebec will be a major blow to Atomic Energy of Canada Ltd. (AECL), which has already run into serious problems with overseas sales of its CANDU reactor.



"TERMINAL NUCLEAR ECONOMICS..."

Richard Willson

THE CLUFF LAKE BOARD OF INQUIRY

In response to growing public concern related to the problems associated with nuclear development in Saskatchewan, the Government of Saskatchewan established a Board of Inquiry in February 1977.

The Board essentially had two tasks: the first, to determine whether the local, economic, environmental, social and occupational health impacts of a major uranium mine would be sufficiently detrimental to warrant that the Saskatchewan Government refuse Amok Ltée permission to proceed with its proposed mine at Cluff Lake, 120 miles north of LaLoche. Secondly, the Board was to consider the potential uses of Saskatchewan uranium and determine if the global implications are sufficiently detrimental to warrant a halt to further uranium mining in Saskatchewan, or whether certain precautionary conditions need to be set before Saskatchewan uranium leaves the province.

The Board is chaired by Justice E.D. Bayda of Regina. The other members are Dr. Ken McCallum, a chemist and Dean of Graduate

Studies at the University of Saskatchewan, and Dr. Agnes Groome, a professor of education at the University of Regina.

In June and July the Board heard evidence on radiation dangers and other occupational health problems that might arise at the proposed Cluff Lake mine. It also considered the social and economic impact the uranium mine would have on all Saskatchewan, but particularly on the people of the north.

In August the Board considered the impact the mine would have on the northern environment. It also heard evidence on the possible cancer risk associated with radioactive gases from the mine—gases which might pervade vast areas and affect people in many parts of the province and far beyond its boundaries.

From August 22 to September 30, the Board will be spending a good deal of time hearing evidence on the dangers of nuclear power plants (the main users of uranium) and the risk that Saskatchewan uranium may eventually be used for military purposes.

The Board also will be hearing of the potential safe alternatives to nuclear power, alternatives which could obviate further nuclear development. The uranium mining companies will, in their turn, be presenting their arguments in favour of development.

In October, the Board is scheduled to travel across the province to hear the views of Saskatchewan citizens at local hearings.

November 1, 1977 has been set by the provincial government as the deadline for the Board's report.

The issue of further nuclear development in Saskatchewan, as outlined in other articles this publication, is one of the most important decisions facing Saskatchewan in this decade. Anyone may make a presentation to the Board of Inquiry, but time is short. If you are interested in presenting your views to the Board, or if you would like to obtain more information, contact: The Cluff Lake Board of Inquiry 802 McCallum-Hill Building Scarth and 12th Avenue Regina, Saskatchewan S4P 2G6 Tel. (306)-565-6234

NUCLEAR DEVELOPMENT IN SASKATCHEWAN. HOW FAR WILL WE GO?

How far will uranium development go in Saskatchewan? Are uranium mines and a refinery all that is planned, or are there any thoughts on the part of the government to build other nuclear facilities?

In respect of nuclear development, it is the position of the Saskatchewan government:

- "(1) That insofar as possible, the maximum processing (of uranium) be undertaken in Saskatchewan.
- (2) That such operations as fabrication of fuel elements, containers and hardware for nuclear reactors be undertaken in the province;
- (3) That Saskatchewan be considered a priority location for heavy water production;
- (4) That use of nuclear energy rather than fossil fuels for power production be encouraged;
- (5) That if an artificially low level is

maintained for oil and natural gas prices, then compensating subsidies must be provided to ensure that nuclear energy is developed;

- (6) Expansion of the pool of nuclear expertise in the province must be encouraged. The development of applied nuclear technology would be encouraged through research and development funds provided jointly by Canada and Saskatchewan.
- (7) Royalties from uranium production must be increased to reflect a more realistic return to the province for this resource.
- (8) Marketing of uranium should involve a federal-provincial marketing board rather than the now-dominant role played by the Atomic Energy Control Board.
- (9) With regard to the U.S.A.,

Saskatchewan takes the position that *maximum emphasis should be placed on exporting electrical energy rather than uranium.*"

That was the position presented by the Government of Saskatchewan at the Federal-Provincial First Ministers' Conference in Ottawa on January 23 and 24, 1974. This conference was attended by Premier Allan Blakeney.

The brief stating the Saskatchewan government's position also urged an expanded uranium exploration program; that all future development of uranium should have a public component in the mining stage; and that the province should attempt to obtain an equity position in Eldorado Nuclear, as well as the other proposed mines, including Gulf Minerals and Mokta (Canada)—now Amok Ltée.

What has happened since that brief was presented in January 1974? We have seen rapid expansion of uranium exploration in northern Saskatchewan, with heavy government involvement through joint ventures with private industry; a new royalty scheme has been put into effect as well. In January 1976, after Saskatoon was mentioned as a possible site for a uranium refinery in a television program dealing with the sloppy waste disposal practices at the Port Hope refinery, Ed Whelan—then Minister of Mineral Resources—announced that negotiations to build a uranium refinery in Saskatchewan had been going on for two years. This news came as a complete surprise to Saskatchewan citizens.

The logical question to ask now is, of course: what other nuclear facilities mentioned in the position statement presented at the First Ministers' Conference (1974) are being planned by the Saskatchewan government without public knowledge or involvement? Has the new research and development cen-

WHAT CAN I DO?

As an Individual

- study the issues and become informed on viable alternatives to nuclear development;
- discuss the nuclear issue with friends, relatives, fellow-employees and neighbours;
- contact the Cluff Lake Board of Inquiry at 802 McCallum-Hill Building, Scarth Street and 12th Avenue, Regina, S4P 2G6. Tel. 306-565-6234, and tell them you'd like a chance to give them your and/or group's opinion;
- write or talk to your Member of Parliament and your Member of the Legislative Assembly, establish a dialogue, ask for a stop to any further nuclear development until we know more about its effects;
- if you are a member of a political party, help develop policy on this issue.

As Member of a Group

- have a speaker on nuclear development at your next meeting.

You can get a speaker through the Saskatoon Environmental Society, Box 1372, Saskatoon, Tel. 306-665-6655; — get your group to send out copies of this publication or other materials on the nuclear issue to all your members;

- organize study groups and seminars to study the issue;
- contact your local radio stations and newspapers to see if they would be willing to carry features on the nuclear issue;
- make a presentation to the Cluff Lake Board of Inquiry. The Board will be holding hearings in many parts of Saskatchewan during October 1977.
- organize coffee parties for your M.P. and M.L.A. and present the issues to them. Ask for their policies.
- get your municipal council and the provincial and national chapters of your group to take a stand;
- present a brief to the provincial government.

FOR FURTHER INFORMATION

1. **Nuclear Power**, Issue 15, United Church of Canada, 6-page tabloid; free on request.
2. **Time to Stop and Think**, the nuclear issue in Canada, contains the text of a Brief presented to Prime Minister Trudeau by the Canadian Coalition for Nuclear Responsibility; 16 page tabloid.
3. **Should Uranium Stay in the Ground?**, this tabloid; the nuclear development issue as it relates to Saskatchewan; free on request.

Bulk Orders: These first three items are available thanks to a grant from the Cluff Lake Board of Inquiry. We will provide bulk orders free on request as long as the supply lasts. However, to enable us to produce further resource materials in the future, we would appreciate donations for bulk orders at the following:
Nuclear Power 3 cents each
Time to Stop & Think 5 cents each
Should Uranium Stay in the Ground? 5 cents each

Please send me the following:

Nuclear Power, Issue 15.....

Time to Stop and Think.....

Should Uranium Stay in the Ground.....

Total.....

I enclose \$.....

Name.....

Address.....

Saskatoon Environmental Society
Box 1372, Saskatoon, Sask. S7K 3N9

MEMBERSHIP in the Society is open to anyone interested in the environment and its care. Annual membership fees include a subscription to **Environment Probe** and entitle you to full, voting participation in the programs of the group. Lend your environment a helping hand by sending in the form below—today.

And if you don't wish to join, you can support the work of the Society through donations. S.E.S. is a registered charitable organization, so all contributions are income tax deductible.

I wish to become a member of the Saskatoon Environmental Society for the coming year. I enclose the annual membership fee:

☐ \$ 5 for Regular Membership

☐ \$ 25 for Supporting Membership

☐ \$100 for Sustaining Membership

☐ \$_____ donation

NAME.....

ADDRESS.....

TELEPHONE.....

Send to: MEMBERSHIP, Saskatoon Environmental Society,
Post Office Box 1372,
SASKATOON S7K 3N9

tre to be located on the University of Saskatchewan campus anything to do with the "development of applied nuclear technology?"

Premier Blakeney has stated a number of times that, "the province has no intention of producing power by nuclear generating plants." What does that statement mean in light of the government's position statement of January 1974, which states that, "nuclear energy ... be encouraged", "subsidies must be provided to ensure that nuclear energy is developed," and "maximum emphasis should be placed on exporting electrical energy rather than uranium." All these statements imply the construction of nuclear reactors. What are the government's real plans? What reason does the government have for not making these plans known to the public? How can the people of this province have a say in such important decisions as these without the necessary information?